CLAIMS:

[C001] 1. A system for processing electromyogram EMG input signals from an external abdominal surface to detect uterine contractions, said system comprising:

a sensor configured to detect an EMG signal and to generate a corresponding EMG input signal; and

a signal processor coupled to said sensor and configured to generate a respective EMG prediction error signal, which represents a magnitude of at least one contraction event and periodicity of a set of multiple contraction events.

[C002] 2. The system of claim 1 further comprising a display device coupled to said signal processor.

[C003] 3. The system of claim 2, wherein said display device is selected from the group consisting of a computer monitor, a instrument display monitor, a bedside display monitor, a printer, and a strip chart recorder.

[C004] 4. The system of claim 1, wherein each of said sensors comprises two EKG electrodes configured to be placed in contact with said exterior abdominal surface adjacent to a uterus.

[C005] 5. The system of claim 1, wherein said signal processor further comprises:

an amplifier coupled to a sensor and adpated to amplify said EMG input signal and provide an amplified representation of said EMG input signal;

a low pass filter coupled to said amplifier and configured to filter said amplified representation of said EMG input signal to generate a low-pass filtered representation of said EMG input signal;

an analog to digital converter coupled to said low pass filter and configured to process said low-pass filtered representation of said EMG input signal to generate a digitized representation of said EMG input signal;

a noise filter coupled to said analog to digital converter and configured to remove a power line structure from said digitized representation of said EMG input signal to generate a noise-filtered version of said EMG input signal; and

a digital processor coupled to said noise filter and configured to process said noise-filtered version of the EMG input signal to compute said EMG prediction error signal.

[C006] 6. The system of claim 5, wherein said digital processor comprises an adaptation algorithm, wherein said adaptation algorithm comprises a parameter estimating portion that is configured to be coupled to a prediction error filter, wherein said parameter estimating portion is configured to compute said at least one prediction coefficient to optimize an EMG prediction error signal performance index.

[C007] 7. The system of claim 6, wherein said adaptation algorithm is further configured to filter said digitized representation of said EMG input signal to compute said EMG prediction signal.

[C008] 8. The system of claim 6, wherein said adaptation algorithm is selected from the group consisting of a Least Square adaptation algorithm and a Burg adaptation algorithm.

[C009] 9. The system of claim 6, wherein said prediction error filter is configured to have model orders in a range from 2 to 10.

[C010] 10. The system of claim 6, wherein said adaptation algorithm is a Least Square adaptation algorithm that has a time interval range from about 2 seconds to about 12 seconds.

[C011] 11. The system of claim 6, wherein said adaptation algorithm is a Burg adaptation algorithm that has a data collection window duration from about 2 seconds to about 10 seconds.

[C012] 12. The system of claim 6, wherein said adaptation algorithm is a Burg adaptation algorithm that has a data collection window duration of about 10 seconds and said prediction error filter is of a fourth order.

[C013] 13. The system of claim 12, wherein said digitized representation of said EMG input signal has a sampling frequency rate range from about 100 Hz to about 200 Hz.

[C014] 14. The system of claim 6, wherein said adaptation algorithm comprises a Burg adaptation algorithm having a data collection window duration of about 5 seconds, said prediction error filter is a fourth order filter, and said digitized representation of said EMG input signal has a sampling frequency rate of about 200 Hz.

[C015] 15. The system of claim 6, wherein said adaptation algorithm is a Burg adaptation algorithm having a data collection window duration of about 10 seconds, said prediction error filter is of a second order, and said digitized representation of said EMG input signal has a sampling frequency rate of about 100 Hz.

[C016] 16. A method for processing electromyogram (EMG) input signals from an external abdominal surface to detect uterine contractions, said method comprises:

generating at least one EMG input signal; and

computing an EMG prediction error signal which represents a magnitude of at least one contraction event and periodicity of a set of multiple contraction events.

[C017] 17. The method of claim 16, further comprising displaying said EMG prediction error signal on a display device.

[C018] 18. The method of claim 16, wherein said step of computing said EMG prediction error signal further comprises:

computing at least one prediction coefficient to optimize an EMG prediction error signal performance index in a parameter estimating portion of an adaptation algorithm; and

filtering a digitized representation of said at least one EMG input signal in a prediction error filter of said adaptation algorithm.

[C019] 19. The method of claim 18, wherein said adaptation algorithm is selected from the group consisting of a Least Square adaptation algorithm and a Burg adaptation algorithm.

[C020] 20. The method of claim 18, wherein said prediction error filter has model orders in a range from 2 to 10.

[C021] 21. The method of claim 18, wherein said adaptation algorithm is a Least Square adaptation algorithm that has a time interval range from about 2 seconds to about 12 seconds.

[C022] 22. The method of claim 18, wherein said adaptation algorithm is a Burg adaptation algorithm having a data collection window duration from about 2 seconds to about 10 seconds.

[C023] 23. The method of claim 18, wherein said adaptation algorithm is a Burg adaptation algorithm that has a data collection window duration of about 10 seconds and said prediction error filter is of a fourth order.

[C024] 24. The method of claim 23, wherein said digitized representation of said EMG input signal has a sampling frequency rate range from about 100 Hz to about 200 Hz.

[C025] 25. The method of claim 18, wherein said adaptation algorithm is a Burg adaptation algorithm that has a data collection window duration of about 5 seconds, said prediction error filter is of a fourth order and said digitized representation of said EMG input signal has a sampling frequency rate of about 200 Hz.

[C026] 26. The system of claim 18, wherein said adaptation algorithm is a Burg adaptation algorithm that has a data collection window duration of about 10 seconds, said prediction error filter is of a second order and said digitized representation of said EMG input signal has a sampling frequency rate of about 100 Hz.